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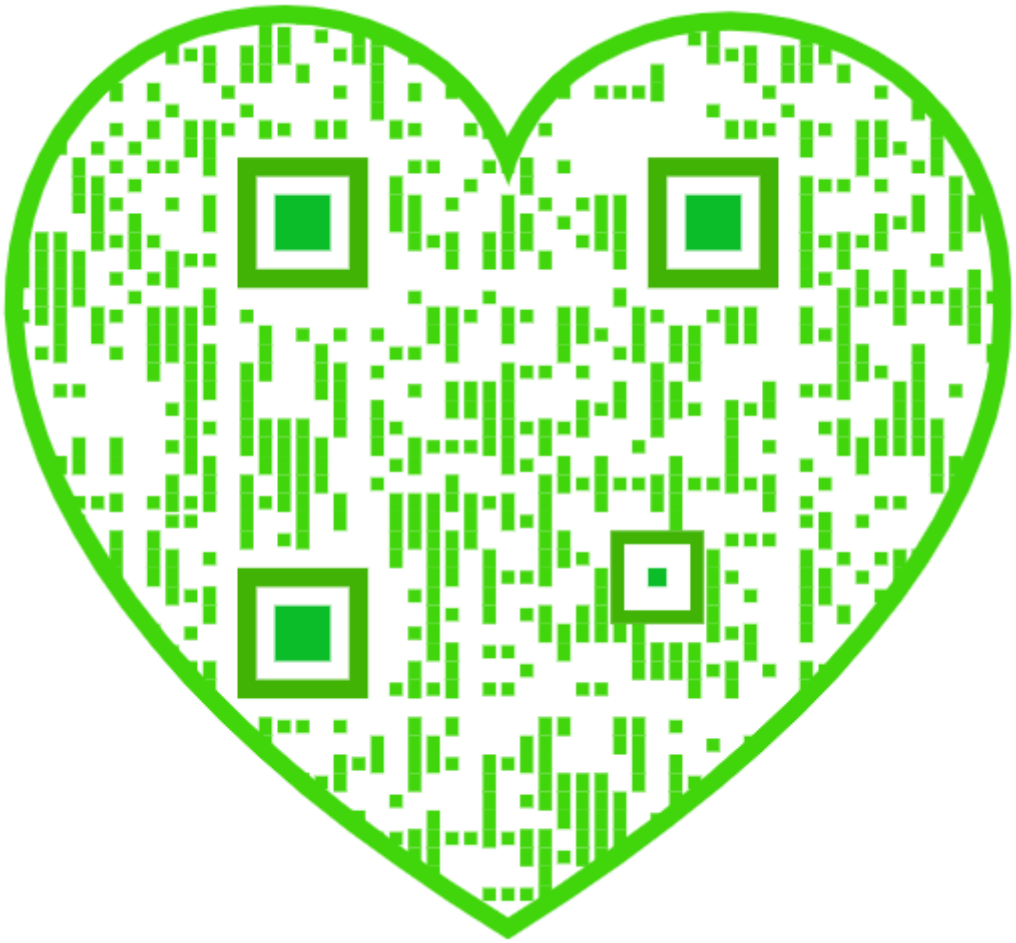
POTATO PRODUCTION IN THE FAR WESTERN STATES



POTATO GROWING in the Western States differs in some respects from that of other geographical areas and therefore demands a separate treatment. Irrigation plays an important part in the production of potatoes in the far West.

The rapid rise of potato production in Idaho and the wide distribution of the crop of this State is attracting considerable interest on the part of eastern potato growers. Wide distribution has been made possible by growing and putting up a high-quality product.

Large yields on most irrigated lands are possible without the use of commercial fertilizers, provided proper crop rotations are followed.

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POTATO PRODUCTION IN THE FAR WESTERN STATES

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INTRODUCTION

THE INCREASING demand for specific information concerning the production of potatoes in certain sections of the United States necessitates the treatment of the subject on a regional rather than a national basis. The term "Far Western States" as employed in this bulletin refers to Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

During the 5-year period from 1925 to 1929, inclusive, the average annual potato acreage of these 11 Western States was approximately 12.5 per cent of the total potato acreage of the United States, and the potato production of these States was about 16.5 per cent of the country's total. In point of production the individual States of this group rank as follows: Idaho, Colorado, Washington, California, Oregon, Montana, Utah, Wyoming, Nevada, Arizona, and New Mexico.

One of the distinctive peculiarities of potato production in these Western States is that a considerable acreage is under irrigation. Census figures for 1919 show that the irrigated acreage was approximately 10.3 per cent of the total potato acreage of those States. Colorado had the greatest potato acreage under irrigation, with Idaho second, and California third. Utah had the highest percentage of its potato acreage under irrigation, with Idaho, Colorado, and Nevada following in the order mentioned.

Commercial fertilizers are not generally used in potato production in the States named. The only outstanding exception to this state-

ment is in the Stockton district of California, where it has been found highly beneficial to apply large quantities of phosphorus and potash to the potato crop grown on peat soils. With this exception and possibly others where potatoes are grown on peat lands, the growers rely on the natural supply of phosphorus and potash in the soil and the nitrogen derived from turning under alfalfa, sweetclover, or other leguminous crops. In this respect considerable expense for fertilizers is avoided by the western potato grower. That it is possible to maintain the fertility of the soil, especially to supply nitrogen through judicious crop rotation, has been amply demonstrated.

CROP ROTATION

While there are no general hard and fast rules relative to length of rotation with other crops, it is a rather common practice to keep the land in alfalfa, in the irrigated sections at least, for from five to seven years. Many growers employing the longer rotation grow two and occasionally three crops of potatoes before seeding the land back to alfalfa.

At the Colorado Potato Experiment Station, located at Greeley, Colo., and operated by the United States Department of Agriculture, a 4-year crop-rotation system was begun in 1915 and continued over a period of 10 years with extremely satisfactory results. The rotation in this case consisted of a crop of potatoes on alfalfa sod, followed the next season with a light seeding of oats and the ordinary seeding of alfalfa, and then by two full seasons in alfalfa. At the close of the 10-year period, when it became necessary to transfer the work to another farm, the fertility of the land and its mechanical condition had been so materially improved as to make possible the production of a large crop of potatoes.

This experience seems to justify the assumption that on small farms it is possible to practice a 4-year rotation, with alfalfa as the soil improver and the potato as a cash crop, with excellent results.

Very satisfactory results may also be obtained when sweetclover is used in the rotation. By using this crop as a soil builder it would be possible to adopt a 3-year crop rotation.

In nonirrigated sections where the rainfall is insufficient or does not come at the proper time of year it is not possible to use leguminous crops in the rotation system. For example, in the Palouse country of northern Idaho and northeastern Washington the potato crop either follows a winter wheat crop or is planted on fallowed land. In the humid portions of western Washington, Oregon, and to a lesser extent California, a greater diversity of crop rotation systems is possible.

SUITABLE SOILS

The potato is probably as cosmopolitan in regard to soil requirements as any of our agricultural food crops. However, like any other crop, it succeeds best on certain types of soil, as, for example, a sandy or gravelly loam soil or a peat or muck soil. Fairly good crops may be produced on black loam or clay loam soils, and indifferent results may always be expected if an attempt is made to produce a potato crop on light shifting sand or heavy clay soils. Poorly

drained soils or those with an impervious subsoil, provided there is little depth of surface soil, should always be avoided.

PREPARATION OF THE SOIL

If best results are to be obtained, the preparation of the land intended for growing potatoes should begin several years before the crop is to be planted. This is particularly true in the geographical area under consideration, because greater reliance than in other regions must be placed on leguminous crops, such as have been mentioned under "Crop Rotation," in maintaining the nitrogen and organic content of the soil, on both irrigated and nonirrigated land.

The proper preparation of the land involves deep plowing and thorough pulverization of the soil prior to planting the crop. It is impossible to produce maximum yields from poorly prepared land. Whether the land should be plowed in the fall or in the spring is largely determined by the physical character of the soil, its exposure, and the previous crop grown. If the soil is inclined to be heavy, it would be benefited by being exposed to the action of frost, snow, and rain during fall and winter. On the other hand, if the exposure or lay of the land is such as to render it liable to undue erosion during the winter, it would be better to plow it in the spring. Some late-crop growers prefer to delay plowing alfalfa sod in the spring until it has made a considerable growth, and then it is plowed to a depth of from 9 to 11 inches. When so handled there is little trouble from surviving alfalfa plants. In plowing alfalfa sod in the fall it is a rather common practice to crown the land; that is, to plow it to a depth of 2 to 4 inches, or just deep enough to cut off the crowns of the alfalfa plants. When this is followed by one or two diskings most of the plants are killed. Fields receiving such treatment are plowed deeply in the spring.

VARIETIES GROWN

The following list of potato varieties, which is submitted for each State, is believed to include most of those that are more generally grown commercially.

Arizona.—Triumph, Early Rose, Burpee Extra Early.

California.—Burbank, Russet Burbank, White Rose, American Giant (Pride, or Wisconsin Pride), Up-to-Date (British Queen), Charles Downing (Idaho Rural), and Garnet Chili.

Colorado.—Rural New Yorker No. 2 (Rural), Russet Burbank, Prolific (Brown Beauty), Charles Downing (Idaho Rural), Peerless (Pearl), Adirondack (Perfect Peachblow, Red McClure), Early Ohio, Irish Cobbler, Triumph, People's.

Idaho.—Charles Downing (Idaho Rural, or Rural), Russet Burbank, Early Ohio, Triumph, People's.

Montana.—Russet Burbank, Triumph, Charles Downing (Idaho Rural, or Rural), Green Mountain, and Early Ohio.

Nevada.—Russet Burbank, Burbank, Charles Downing (Idaho Rural), Peerless (Pearl), and Early Ohio.

New Mexico.—Irish Cobbler, Green Mountain, Russet Burbank.

Oregon.—Burbank, Russet Burbank, Pride of Multnomah, White Rose, Early Ohio, Charles Downing (Earliest of All, Idaho Rural).

Utah.—Rural New Yorker No. 2, Russet Burbank, Early Ohio, Irish Cobbler, Charles Downing (Idaho Rural), Green Mountain, Triumph, and Peerless (Pearl).

Washington.—Burbank, Russet Burbank, Charles Downing (Idaho Rural, Earliest of All), Rural New Yorker No. 2.

Wyoming.—Russet Burbank, Triumph, Charles Downing (Idaho Rural), Peerless (Pearl), and Spaulding Rose (Spaulding No. 4, Rose No. 4, King).

SEED

IMPORTANCE OF GOOD SEED

So much has been said and published during the last few years regarding good seed that further statements on the subject seem unnecessary. However, each year presents overwhelming evidence of the failure of many growers to grasp the fact that without the use of good seed it is impossible to produce large yields. As a result of the seed-potato certification agencies that have been established in practically all of the States under discussion, it is now possible for those who desire to plant good seed to procure it either through the seed-certification agencies or from individuals whose seed has been certified. There is, therefore, little excuse at the present time for any grower using poor seed. The title-page illustrates choice seed stock.

SEED TREATMENT WITH DISINFECTANTS

The value of the treatment of seed potatoes with disinfectants is still questioned in some sections. This is largely due to the fact that where soils are heavily infected with common scab or Rhizoctonia organisms there is little apparent benefit from seed disinfection. As a rule, however, it pays to treat seed potatoes before planting them. The effectiveness of the treatment is largely dependent on how closely the operator follows instructions with the disinfectant employed, and the maintenance of strength of the solution if the corrosive-sublimate treatment is used. Seed treatment should be regarded in the nature of a safeguard or insurance against surface-borne tuber diseases. The virus diseases are in nowise affected by seed treatment.

The two standard materials in use as seed-potato disinfectants are corrosive sublimate (mercuric chloride) and formaldehyde, but in the last few years several organic mercury compounds bearing trade names have been widely heralded by the manufacturers as being more easily and quickly applied. Inoculated flowers of sulphur broadcast at the rate of 200 to 300 or more pounds per acre and well worked into the soil has proved highly efficacious in the control of scab on some types of soil and apparently totally ineffective on others.

The standard solutions and time of treatment in the case of corrosive sublimate and formaldehyde are as follows:

COLD TREATMENT

Corrosive sublimate.[1]—Four ounces of corrosive sublimate (mercuric chloride, $HgCl_2$) ; 30 gallons of water. Soak potatoes one-half to one and one-half hours[2] in the solution. (Fig. 1.)

Formaldehyde.—One pint of formalin (40 per cent solution of formaldehyde gas) ; 30 gallons of water. Soak as above.[2]

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[1] Corrosive sublimate is a deadly poison, and every precaution should be observed in its use. It also has a great affinity for metals. It should never be put into metal containers unless they are covered with a coating of asphaltum or other protective material.

[2] The length of treatment should be governed by the condition of the seed stock. If the seed is moderately infected with either common scab or Rhizoctonia, give it the longer treatment. If it is badly germinated, the treatment should be shortened to avoid injury to sprouts or eyes.

HOT TREATMENT

Use 2 pints of formalin and 30 gallons of water. Immerse tubers in hot solution (125° F.) for three to four minutes.

The hot formaldehyde treatment has become sufficiently popular in some sections to make possible community equipment of sufficient capacity to treat large quantities of seed stock. Where such practice prevails, the seed is usually treated in sacks and is allowed to dry in them. When the seed is badly infected, especially with Rhizoctonia, it is a good plan to cover the sacks with burlap or heavy blankets for an hour on removal from the hot solution in order to prolong the effect of the treatment. The seed is usually treated before cutting it.

In the case of home treatment of seed, by either the hot or the cold method, the open slat crate makes a good container. It is easily

FIGURE 1.—A large tank for the treatment of seed potatoes. The sacks are lifted into and out of the tank by means of a pulley block and rope tackle

handled and allows the treated seed to dry almost as quickly as if spread out on a canvas. The crate also has another advantage in that the seed can be held in it until cut and planted, thus guarding against the possibility of reinfection by coming in contact with contaminated containers or soil if spread out to dry.

Figures 2 and 3 illustrate the ingenuity of a firm of potato growers in the Stockton district in the construction and operation of a large-capacity hot-formaldehyde treating plant mounted on a barge which is moved about from camp to camp by a small launch.

CUTTING THE SEED

In cutting seed potatoes it should be borne in mind that a good-sized seed piece has a much better chance to grow under unfavorable soil or temperature conditions than small-sized ones. (Fig. 4.) Small whole seed may be used if produced by healthy plants.

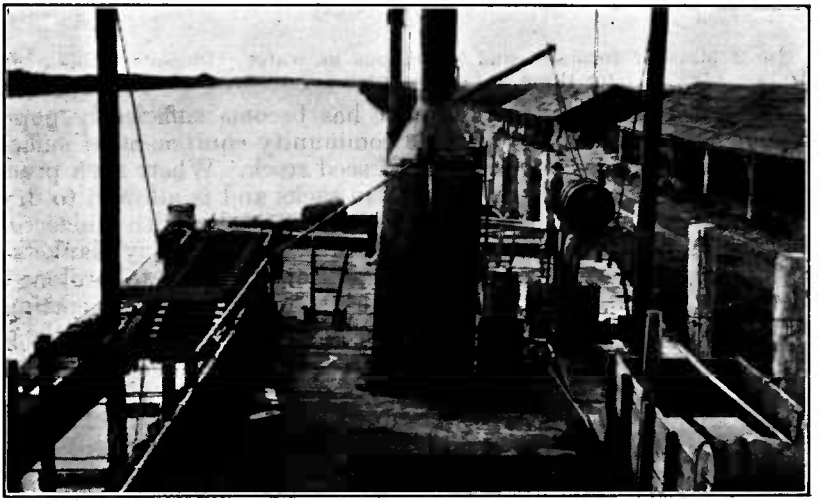

FIGURE 2.—General view of a hot-formaldehyde seed-treatment outfit mounted on a barge and towed from camp to camp in the Stockton, Calif., district

FIGURE 3.—The seed-treatment equipment in operation (Stockton, Calif.). Note emergence of sacks at opposite end

Numerous mechanical devices for cutting seed potatoes have been evolved and patented from time to time. Some of them are designed for hand and others for power operation. While such implements reduce the time element to a minimum, they are nevertheless mechanical, and consequently a small percentage of no-eye seed pieces may be expected. There is no satisfactory substitute for careful hand cutting of seed potatoes. The efficiency and the output of the individual may be materially increased by the use of the cutting box and a rigidly-fixed knife blade. This plan of cutting is illustrated in Figure 5. In this particular arrangement the operator cuts the potato by pulling it toward him. Some prefer to push the potato against the blade of the knife. It seems easier and more logical to pull toward rather than to push away from oneself. With a good cutting box and substitute knives an active person may cut as much as 40 or more bushels per day, as against possibly 25 or 30 bushels when the knife is held in the hand.

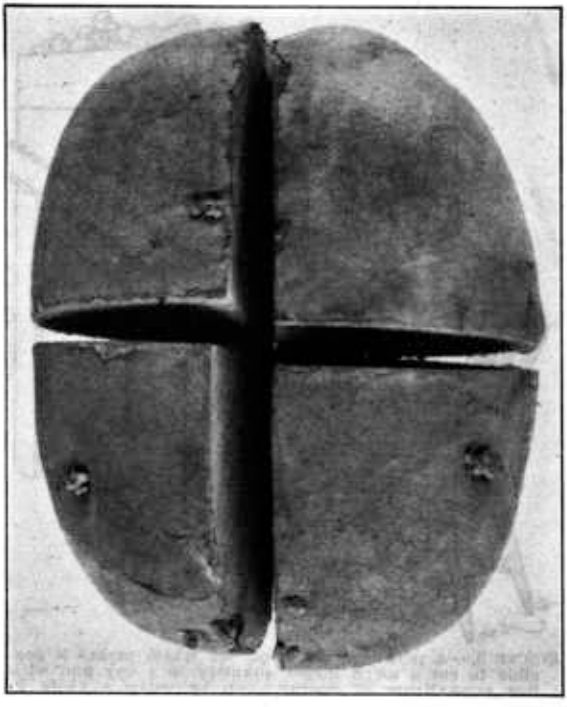

FIGURE 4.—Large blocky seed pieces insure good stands and large yields

CARE OF FRESHLY CUT SEED

It is possible to cut seed potatoes some time in advance of planting if proper conditions are provided to facilitate the suberization or corking over of the cut surface. It has been found that at a temperature of from 60° to 70° F. with an 85 per cent atmospheric humidity the formation of cork cells or periderm tissue seems to progress most rapidly. Exposure for 10 days to such temperature seems to be sufficient to insure good suberization, after which the cut seed may be held for several weeks at a temperature of 36° to 40° if desired.

If the seed is to be planted immediately after cutting, its handling in the planter will be facilitated if it is dusted with some absorbent such as land plaster, sulphur, slaked lime, or cement.

PLANTING

The sets (seed pieces) should be planted from 3 to 4 or more inches deep, according to the type of soil and whether they are to be grown

as an early or a late crop. Shallower planting is practiced more often in the case of the early than of the late crop. Deeper planting is more necessary under dry-land farming than under irrigation.

Every effort should be made to secure as nearly a 100 per cent planting as possible. The 2-man type of planter will more nearly approximate this degree of perfection than will the picker type, although the latter will do excellent work if the seed is cut into uniform-sized, blocky sets.

SPACING

In determining the proper distance between rows and spacing of the sets in the row, it is necessary to consider the character of the soil and the available soil moisture. For example, in dry-land potato production a much wider row spacing is necessary than under irrigation. Under dry-land conditions the interrow spacing usually varies from 40 to 48 inches and the sets in the row from 18 to 30 inches. Where the normal rainfall is usually large enough to produce a good crop, as, for example, in the western portions of Washington and Oregon, the spacings may be approximately the same as on irrigated land.

FIGURE 5.—A potato seed-cutting box which makes it possible to cut a much larger quantity in a day and with less expenditure of energy than by using a knife in the hand

Under irrigated conditions the spacing must be sufficient to permit running the irrigation water between the rows. Generally the distance between rows ranges from 36 to 42 inches, and the sets may be spaced from 9 to 12 inches apart in the rows, depending on the variety and the fertility of the soil.

IRRIGATION

The successful production of potatoes under irrigation is largely dependent upon the intelligent application and use of water. There are many practices and theories concerning the time frequency and the quantity of water to apply at each operation. There are growers who firmly believe that water should not be applied to the crop until the plants give visible evidence of low soil moisture by the dark color of the foliage and an apparent cessation of active growth. Such growers claim that it is not desirable to apply water until tuber

development has begun. Growers are also divided in their opinions as to the frequency and rate of application after this date, some preferring infrequent heavy irrigations and others the reverse. As a result of 14 years of study of early and late, frequent and infrequent, light and heavy irrigations at Greeley, Colo., it has been found almost universally that when the proper soil moisture was retained throughout the growing season, or rather up to the time the tubers had reached full size, heavier yields were rather consistently obtained. It has also been found that frequent light or medium-light irrigations were preferable to infrequent heavy ones.

TILLAGE

The practice of using a harrow or a weeder on the potato field before the plants emerge from the soil is on the increase. Many of the best growers now recognize the value of such tillage in subduing weeds and preventing the formation of a soil crust with its consequent increased water evaporation. Two such tillage operations may serve to discourage weed growth throughout the growing season.

The subsequent cultivation of the crop is dependent on whether it is being grown under dry-land, humid, or irrigation conditions. Ordinarily, for the first two of these conditions two or three cultivations subsequent to the emergence of the plants are sufficient. Later tillage might be necessary under irrigation, in order to aerate the soil and maintain deep furrows for the flow of the water.

SPRAYING AND DUSTING

In many of the Western States spraying or dusting for protection against insect pests is an effective measure of insuring good crop production, other things being equal. This is particularly true with respect to areas infested with the Colorado potato beetle and the flea beetles.

The remedy for chewing insects, such as the potato beetle and the blister beetles, is some form of arsenical poison, such as calcium arsenate, lead arsenate, zinc arsenite, or Paris green.

In the case of the flea beetles, which in their adult stage injure the potato foliage and in their immature stage attack the tuber, a combination of Bordeaux mixture and calcium arsenate or other arsenical poison appears most effective in their control. Direct control with insecticides, however, is extremely difficult.

It is seldom that the early or late blight fungous diseases are sufficiently prevalent to justify spraying with both mixtures.

HARVESTING AND MARKETING

In the early-producing sections the crop is usually harvested when it is more or less immature, depending upon market price and demand. High prices and an active demand usually mean the harvesting of decidedly immature stock.

Practically every commercial potato grower now uses an elevator type of digger to harvest his crop, whereas in 1910 all the potatoes grown on the peat lands in the Stockton, Calif., district were dug

by hand. The more common practice is to use an elevator digger drawn by either four or six horses. (Fig. 6.) Some of the larger operators are now using tractors instead of horses and are not content to dig a single row but dig two or three rows in one operation. Figure 7 shows the operation of the three-row tractor-hauled battery of diggers and the elevating and depositing of the tubers with accompanying débris into a tractor-hauled truck accompanying the digger. Figure 8 shows the process of washing the potatoes prior to sacking and marketing them.

The early-potato crop is usually marketed as it is harvested. The potatoes are picked up in wire or splint baskets and are dumped on hand or power graders and sacked, usually within less than an hour after they are removed from the ground. Throughout the West both early and late crop potatoes are invariably marketed in burlap sacks. Most growers have come to realize that a new attractive package materially aids in marketing the crop advantageously.

FIGURE 6.—Operating an elevator type of digger with four horses. Note the cloddy, compact soil. (Near Greeley, Colo.)

STORAGE

The best types of storage houses are found in the Mountain States. Usually they are constructed so as to permit driving into them through at least one end, and in many cases of driving clear through. For further details on storage the reader is referred to Farmers' Bulletin 847, Potato Storage and Storage Houses. The bulk of the late crop of necessity must be stored for later marketing.

When the crop is to be stored, the common practice is to dump two or three half-bushel baskets into a sack, which is left untied; the sacks are then hauled to the storage house.

In Washington, Oregon, and California less attention has been given to storage houses, the bulk of the late crop being stored in pits in the open field. In the Stockton district of California the potatoes are either piled on the ranch levees and covered with tule leaves and stems or are stored in sacks in more or less open sheds.

CULTURAL PRACTICES AND PRODUCTION CENTERS BY STATES

To aid the reader in acquiring information relative to the potato industry of a given State it seems desirable to present briefly the salient facts with respect to cultural practices and production centers in each State. More specific information may be obtained from

FIGURE 7.—A 3-row potato digger in operation near Stockton, Calif. This digger elevates the potatoes and transfers them to the truck. The soil and vine débris deposited with the potatoes is removed by dumping the load into a large water tank supplied with flowing water, which floats off the plant débris. The potatoes are elevated from the tank by a conveyor, which deposits them in the washer

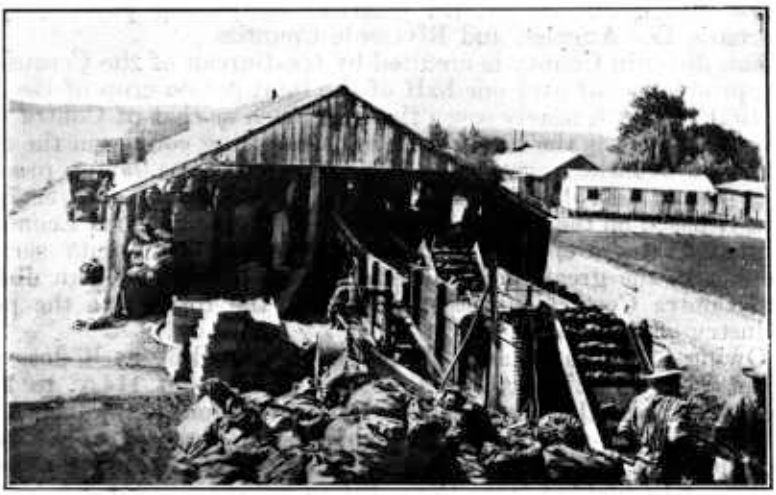

FIGURE 8.—Washing potatoes on the wholesale plan. The tubers come out of this washer well cleaned. They drop from the conveyor belt into burlap sacks, thus avoiding hand labor

publications of the State agricultural experiment stations and from consultation with extension specialists.

ARIZONA

The potato crop of Arizona is of relatively little commercial importance. Only a small proportion of the potatoes consumed are produced in the State. The chief reason for this is that the potato can be successfully produced in only a few especially favored localities in the mountains where irrigation water is available. In such sections, as, for example, in the vicinity of Flagstaff, in Coconino County, a small Triumph seed-potato industry has been developed.

In the southern part of the State in the hot valleys potatoes do fairly well when planted at the proper time and given good cultural care. Planting in February is recommended in preference to December or January planting in southern Arizona for the early spring crop, because the plants are less liable to serious frost injury.

Planting must be done as early as possible for the potatoes to reach maturity before high temperatures injure the crop. The spring crop is usually harvested in June. A fall crop may be produced from the spring crop by planting during August or early September; the plants are usually killed by frost about the first of December. The tubers then are generally immature.

CALIFORNIA

The principal potato-producing districts in California are the delta lands of San Joaquin and Contra Costa Counties, sometimes referred to as the Stockton district; the Salinas Valley in Monterey County; the Napa and Sonoma Valleys in their respective counties—Napa and Sonoma—and the districts comprising parts of Santa Barbara, Los Angeles, and Riverside Counties.

San Joaquin County is credited by the Bureau of the Census with the production of over one-half of the total potato crop of the State in 1924 and with nearly seven times as much as that of Contra Costa County, which is the second heaviest producing county in the State. The two counties together, representing the delta lands, produced over 70 per cent of the total California potato crop, or over 72 per cent if based on the report of the Bureau of Agricultural Economics, United States Department of Agriculture. These data serve to emphasize the great importance of the delta lands of San Joaquin and Contra Costa Counties, particularly the former, in the potato industry of the State.

Owing to the large area of the State, extending as it does from about 32.5° to 42° north latitude and from about 114.5° to 124.5° west longitude, there is a wide variation in climatic conditions. As a result of this the planting and harvesting seasons extend over a considerable period. For example, in southern California the early crop may be planted from December to February or March, and the late crop in August and September or even later.

In the Stockton district, plantings may extend from the latter part of February to June 15. The bulk of the early-crop planting is made in March or April, while that for the late crop is done in May and the early part of June.

As a considerable portion of California's acreage is grown under irrigation, and as the total acreage in the Stockton district is an irrigation enterprise, the cultural practices of this district may be of interest.

The soil consists very largely of Juncus (tule) or other marsh plants in various stages of decomposition, varying from partially decomposed plant remains to fully developed peat and muck formation.

Only two varieties as a rule are grown in this district—the Burbank and Wisconsin Pride or American Giant. Seed of the Wisconsin Pride is mostly obtained from Minnesota or Wisconsin. Home-grown seed from this stock is used the following year. The Burbank seed is obtained from Washington or Oregon and grown similarly to the Wisconsin Pride for local seed purposes.

Fall plowing to a depth of from 10 to 12 inches is recommended, with thorough preparation of the soil in the spring prior to planting. The usual practice is to plant from 18 to 20 bushels of seed per acre, but where large acre yields are desired this quantity is practically doubled.

Deep planting, 4 to 7 inches, has been found desirable on this type of soil with the system of irrigation practiced. Close spacing of rows, also plants in the row, is general. Usually the rows are spaced from 26 to 30 inches apart and the sets (seed pieces) 8 to 10 or more inches apart in the row.

Level culture is practiced, thereby allowing the harrowing of the field before the plants appear. Irrigation is accomplished by cutting narrow ditches, spaced from 50 to 75 feet apart. These are filled with water from the main or lateral irrigation ditches, which in turn derive their water supply through siphoning it over the levees. The irrigation ditches are kept full until the water seeps through the intervening spaces. In other words, subirrigation rather than the ordinary type of irrigation is used.

The peat or muck soils permit a rapid diffusion of moisture, which is also facilitated by cutting the ditches to a depth of 20 to 30 inches. With a little wider spacing between the rows in which the narrow ditch is cut there is little loss of land or of crop due to the ditches. The deeper planting permits maintaining a dry surface soil mulch and still insuring an abundance of moisture for the plants. As soon as the soil has absorbed sufficient moisture the water is drained out of the irrigation ditches, thus permitting the land to remain sweet and well aerated. The water is usually lowered in the main irrigation supply ditches or canals by means of electrically operated pumps that discharge the water back over the levee banks into the river whence it was originally drawn. The application of water is repeated as often as may be necessary for the development of the crop.

COLORADO

Colorado has the distinction of being the second largest producer of potatoes of the western group of States, being exceeded by Idaho; and it grows the largest acreage of irrigated potatoes in the 11 States.

The leading potato-production centers in Colorado are the Greeley district in the northeastern part of the State; the San Luis Valley in the south-central part; the Grand, Gunnison, and Uncompahgre

Valleys in the west-central portion; and the Carbondale and Eagle River districts, also of the west slope.

Until 1909 the Greeley district enjoyed the distinction of being much the largest production center in the State. In that year and for several years thereafter an unusually severe and widespread attack of soil-borne diseases, such as those caused by Fusarium and Rhizoctonia, nearly ruined the potato industry. During this period the San Luis Valley section became the leading center. With the subsidence of the disease outbreak the Greeley growers have increased their acreage but have not yet returned to normal. Although the major portion of the acreage is under irrigation, many dry-land potatoes are produced in the Greeley district, a considerable portion of which is used for seed purposes.

The leading variety grown in the San Luis Valley is the Prolific (syn. Bresee's Prolific, Brown Beauty). This variety is known to the trade as Brown Beauty. Other varieties grown are the Charles Downing, Russet Burbank, Adirondack (syn. Perfect Peachblow, Red McClure), and a few Peerless and Irish Cobbler. As in the Greeley district, the bulk of the crop is grown under irrigation. In the higher valleys or plateaus—too high for the application of water—some excellent dry-land seed is produced. In the western slope valleys included in the two general production districts previously listed, the Russet Burbank and Adirondack are the leading late varieties and the Irish Cobbler, People's, and Charles Downing are the leading early and medium-maturing varieties.

The San Luis Valley potato growers have a 600-bushel-per-acre club which was organized in 1927 with 15 applications for membership. Eleven of this number succeeded in producing 600 bushels or more per acre and automatically became bona fide members. In 1928 a grower (L. G. Schutte) near Monte Vista produced 1,047.4 bushels on an officially measured acre. This yield was obtained on alfalfa sod land to which no commercial fertilizer had been applied. In 1929 he produced on the same land an estimated yield of 1,145.17 bushels on an acre.

IDAHO

Potato production in Idaho is greater and has shown a more rapid increase than in any of the other States included in the group.

Idaho has several well-recognized production centers, such as Idaho Falls, Boise, Burley, Blackfoot, and the Twin Falls irrigation project.

The soil of the Idaho Falls district is a warm sandy loam which is easily handled. Irrigation water comes from the Snake River. The Russet Burbank is the most extensively grown variety in this section; the Charles Downing is also grown. Rural New Yorker No. 2 is of some importance as a late crop.

On the Boise irrigation project Caldwell is probably the heaviest shipping point. The crop in this district consists almost wholly of the Charles Downing, which is grown largely for early marketing, being shipped as a rule during the latter part of July and throughout August. Early ripening of the plants is artificially induced by the withholding of water. In seasons when high soil and air temperatures prevail during this artificial ripening period scalding of the tubers is almost certain to induce a considerable loss from decay.

The Burley district is next in extent to that of Idaho Falls, while the Blackfoot and Twin Falls sections are of much less importance.

Seed-potato production in Idaho is becoming more and more restricted to dry-land areas, particularly in the northern part of the State. The reason is the fact that the growers in the irrigated portions of the State are recognizing that it is more advantageous to buy northern-grown seed and sell their own potatoes for table purposes instead of attempting to produce seed themselves.

MONTANA

Potato production in Montana has shown a moderate decline in recent years. The Kalispell or Flathead Lake district is the largest commercial production center. The Russet Burbank is the most important variety there. A considerable commercial potato area has been developed in the vicinity of Helena, where it is claimed that the Russet Burbank reaches a high state of perfection. A sizable Triumph seed-potato industry has been developed in the northern part of the State along the Great Northern Railway.

Montana, like most other States, can easily double or treble her present production whenever there is a profitable market outlet for the crop, but there is no prospect of such a development in the near future.

NEVADA

A situation somewhat similar to that in Montana with respect to decreased acreage and production exists in Nevada. The chief potato producing districts are the Truckee Valley, the Newlands reclamation project, and the Carson and Mason Valleys. Large areas of the Newlands reclamation project and of Mason Valley are said to be very well adapted to potato culture.

The crop is normally planted from May 15 to June 1. The Russet Burbank has become the leading variety.

NEW MEXICO

The potato crop of New Mexico is of comparatively little commercial importance. Climatic and soil conditions seem to be the limiting factors, as it is practically impossible to grow potatoes successfully in most of the valleys. High temperatures and heavy infections of the soil with Fusarium and Rhizoctonia diseases are probably largely responsible for crop failures. In some sections lack of moisture is the limiting factor.

In comparative studies of the varietal behavior of 10 lots of potatoes on the Bluewater project in Valencia County by the New Mexico Agricultural Experiment Station in 1927, the Green Mountain and Russet Burbank varieties made the largest yield, being at the rate of 157 and 115 bushels, respectively, of No. 1 tubers per acre, with a total yield of approximately 190 and 150 bushels per acre. The crop was planted on dry soil on May 7 and was irrigated on May 14, June 28, and July 11.

It is apparent from these data that there are localities within the State that are sufficiently well adapted to the potato crop to permit growing enough at least to meet the local requirements.

OREGON

Two very distinctive types of climatic conditions are encountered in Oregon, the eastern half of the State having a more or less semiarid climate while the western portion is distinctly humid. The potato industry has shown a considerable decline in recent years.

The largest production centers are in Clackamas, Malheur, Multnomah, Marion, and Lane Counties. Potato production in Clackamas County is of interest because a considerable portion of the crop is grown on peat soil, reclaimed and irrigated in a manner similar to that of the Stockton district in California. Four of the five leading counties in potato production are in the western or humid portion of the State, while the other county—Malheur—constitutes the southeastern corner of the State.

The Blue Mountain region in the northeastern portion of the State is claimed to be the most favorable certified seed-producing area, on account of having a sufficient rainfall to produce a paying crop when good dry-farming practices are employed.

Throughout Oregon early planting seems to give best results. In western Oregon the most successful planting dates are April 1 to 15; in the Columbia Basin about April 1, and at the higher elevations from April 15 to 20.

UTAH

In point of potato production Utah occupies seventh position among the 11 States. Production has decreased somewhat, partly as a result of a partial failure of the crop in certain districts in 1927 and 1928 because of severe injury to the plants by psyllids. The following counties in the order named are the heaviest producers of potatoes: Davis, Weber, Salt Lake, Utah, and Box Elder.

WASHINGTON

The climatic conditions prevailing in Washington are very similar to those mentioned for Oregon, in that the western portion is humid and the eastern part semiarid. In point of production the State occupies third position, being exceeded by Idaho and Colorado.

Washington has two rather well-recognized irrigated sections, the Yakima and the Wenatchee Valleys, which produce considerable quantities of potatoes. The largest producing counties are Yakima, Spokane, Benton, Skagit, and King. The Yakima Valley district is noted for its production of high-class Russet Burbank potatoes.

WYOMING

In potato production Wyoming occupies eighth position in the group of States under consideration, and like some of the others, it has experienced a decline in this industry.

The principal potato-producing counties in Wyoming are Goshen, Park, Sheridan, Niobrara, and Laramie. In the Torrington district in Goshen County potato production is of comparatively recent development. The soil seems to be especially suited to the potato. Powell is in the center of the potato-producing area of Park County.

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